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(19)(CA) **CANADIAN PATENT** (12)

(54) Interlocking Shingles or Siding

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ABSTRACT OF THE DISCLOSURE:

An insulating shingle board molded from a suitable insulating material is disclosed. The board is molded with recesses on its inner face to provide strengthening ribs and air insulating pockets. Grooves are provided to allow the pockets to breathe. Two sets of interlocking rib and slot are provided on the top and bottom edges of each board to lock the same to any upper or lower board in a fully weathertight manner. One of the set is made in one direction of movement between two boards to be interlocked, while the other set is made in a second direction of movement transverse to the first direction. A set of interlocking grooves is also provided on both side edges of each board to any lateral board in a fully weathertight manner.

BACKGROUND OF THE INVENTION

a) Field of the invention

The present invention relates to an insulating shingle board for use in the manufacture of roof or wall shingle coverings.

The invention also relates to an insulated shingle comprising such an insulating shingle board in combination with a suitable covering.

b) Brief description of the prior art

Many types of roof or wall coverings are known. Asphalt shingles are a common types of roof or wall covering. The asphalt shingles comprise flexible asphalt panels applied in overlapped relation on roof sheathing boards or panels. Metal or concrete panels are also often employed as roof or wall coverings (see, for example, U.S. Patent 4,432,183). The metal and concrete panels overlap and interlock with each other in a weaathertight manner. An example of such metal, roof covering, panels is shown in Canadian Patent 957,122. Wooden, or simulated wooden, shingles or planks are also used in roof or wall coverings, especially in New England. An example of such shingles or planks is shown in U.S. Patent 3,626,439. Other roof covers employ layers of felt paper and tar, covered with sand or gravel to protect a roof in a weathertight manner.

The known roof and wall coverings are, in practise, very poor insulators. In addition, the top-to-bottom and/or side-to-side interconnections between the roof covering elements are not always as weathertight as desired. In particular, a strong wind often drives water up between the elements.

It is also known to provide siding panels that are insulated. The siding panels cover the sides of a building in an overlapped and interlocked manner to both protect the

building and to insulate it. An example of such a siding panel is shown in U.S. Patent 4,399,643. However, the insulation value of these siding panels is quite low. In addition, the siding panels often do not have weathertight interlocking joints that are as good as the joints used on the roof panels.

SUMMARY OF THE INVENTION

A first object of the present invention is to provide an insulated shingle for use as a roof or wall covering, which has good insulation properties thereby allowing substantial reduction of the condensation inside the house and which makes good, weathertight, overlapped and interconnected joints.

Another object of the present invention is to provide an insulated shingle which is easily handled, lightweight yet strong, and very easy to install.

A further object of the present invention is to provide a shingle that not only insulates well and makes good weathertight joints, but is also constructed so that it provides an additional under-roof in which air can circulate and thus allow any moisture emanating from the substructure to escape to the atmosphere.

The shingle, in accordance with the present invention, comprises a board molded from suitable insulation material such as high density polystyrene. The board is formed to have a smooth outer face and a support inner face.

The shingle is also provided with improved interlocking means to make the joints between adjacent shingles more weathertight. The interlocking means which join the panels in one row to panels in an adjacent row may comprise a first rib and slot connection made by moving one panel, relative to the other panel, in a direction generally paral-

lel to the panels, and a second rib and slot connection made by moving one panel relative to the other panel in a direction generally transverse to the panels. The two rib and slot connections together provide a good weathertight joint.

Preferably, the support inner surface may comprise recesses defining a grid-like, rib structure. The recesses permit less material to be used for the manufacture of the board. The recesses also form air pockets which add to the insulation properties of the board when it is installed. The resulting rib-structure, defined by the recesses, strengthens the board, making it quite rigid and easy to handle.

Means may also be provided on the board to connect the recesses on the inner face of the board with its outer face so that the board can breathe. Preferably shallow grooves on the inner face of the ribs interconnect the recesses, and additional groove means connect one of the recesses to the slot in the second rib and slot connection. From this slot, air can pass to the atmosphere.

Each board can be provided with an outer protective layer of tar or hard plastic, or an integrally molded skin. Alternatively, a protective layer can be applied to all the boards after they are installed.

The invention is particularly directed toward a shingle board molded from suitable insulating material, wherein:

- said board has a generally quadrangular shape defined by a top edge, a parallel bottom edge, and side edges joining the top and bottom edges and extending transversely to the top and bottom edges;

- said board tapers in thickness from the bottom edge to the top edge to have the top edge thinner than the bottom edge;

- said board has an outer, planar, protective

surface and an inner, support surface;

- said board comprises first interlocking means at the top and bottom of the board to interlock the top of one board to the bottom of another board, said first interlocking means comprising first and second ribs at the top of the board, and first and second slots at the bottom of the board, the first rib projecting from the top of the board in a direction parallel to the outer surface of the board, the second rib projecting from the outer surface of the board in a direction transverse to said outer surface, the first slot extending upwardly into the board, and the second slot extending outwardly into the board, said second slot being wide enough to allow a second rib on another board to move laterally therein while the first rib on the other board is slid into the first slot;

- said board comprises second interlocking means on each side of the board, said second interlocking means comprising a first side groove and a first lip formed on one side of the board, the first side groove opening toward the outer surface of the board, and the first lip extending toward the outer surface, and a second side groove and a second lip formed on the other side of the board, the second side groove opening toward the inner surface of the board, and the second lip extending toward the inner surface; said second side groove being located and sized to snugly receive the first lip from an adjacent board while the second lip snugly fits in the first side groove of said adjacent board, to lock the two boards tightly together side by side; and

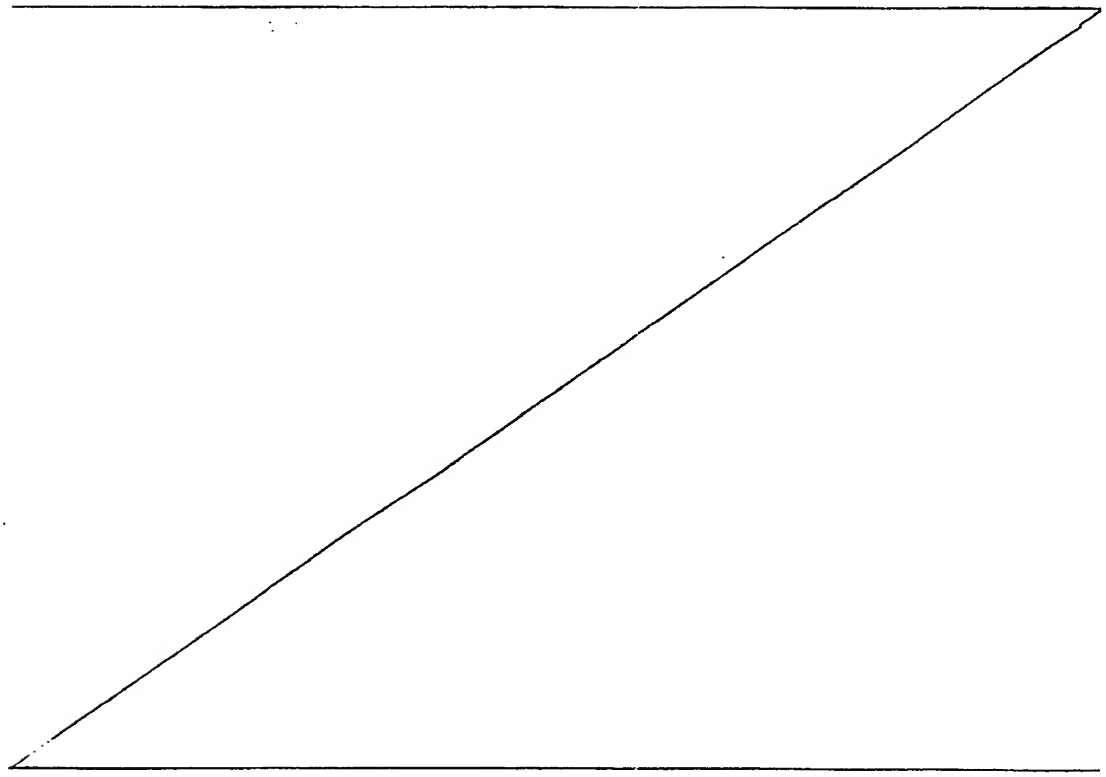
- said board further comprises an array of recesses formed in the board and extending inwardly into the board from its inner support surface and means for permitting the circulation of air from the recesses, when the board is mounted in place, to the exterior of the board, said air circulation means comprising a network of

circulation grooves in the inner surface of the board interconnecting the recesses, a slot in the bottom of the board extending across the board between its two side edges, and at least one outlet groove connecting one of the circulation grooves to the bottom slot.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood upon reading the following non-restrictive description of a preferred embodiment thereof, given with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of an insulating, shingle board according to the present invention, looking



at its inner surface;

Fig. 2 is a perspective view of the board shown in Fig. 1, looking at its outer surface;

Fig. 3 is a front view showing a roof partly covered with boards as shown in Figs. 1 and 2.

Fig. 4 is a cross-section view of Fig. 3 taken along line 4-4;

Fig. 5 is a detailed cross-section view showing two boards about to be joined side to side;

Fig. 6 appearing on the same sheet of drawings as Figs. 1 and 2, is a cross-section view showing the two boards joined side to side;

Fig. 7 is a cross-section view showing two boards about to be joined edge to edge;

Fig. 8 is a view similar to Fig. 7 showing the two boards partly joined edge-to-edge;

Fig. 9 is a view similar to Fig. 8 showing the two boards completely joined edge-to-edge; and

Fig. 10 is a detail cross-section view showing a breathing slot where two boards interlock.

DESCRIPTION OF A PREFERRED EMBODIMENT

The shingle board 1 according to the present invention as shown in Figs. 1 and 2, has a quadrangular shape with a top edge 5, a bottom edge 7 parallel to the top edge 5, and side edges 9 and 11 that are transverse to the top and bottom edges 5 and 7 parallel to each other. The board 1 has an inner support surface 13 and an outer protective surface 15. The inner and outer surfaces 13 and 15 slope toward one another toward the top edge 5, thereby giving the board 1 a slight wedge shape when viewed from the side with the bottom edge 7 being thicker than the top edge 5.

The inner support surface 13 of the board 1

supports it against a roof or wall surface 17 on which the board 3 is to be mounted as shown in Figs. 3 and 4. The inner support surface 13 is recessed in a regular pattern to reduce the amount of material required for the manufacture of the board, and to lighten it without unduly weakening it. The recesses 19 in the inner support surface 13 are quadrangular in shape and are arranged in rows and columns separated by vertical ribs 21 and horizontal ribs 23 as shown in Fig. 1. The vertical and horizontal ribs 21 and 23 are equally spaced apart. One of the vertical ribs 21A is adjacent to, and forms part of one side edge 9. Another vertical rib 21E is set inwardly slightly from the other side edge 11. One of the horizontal ribs 23A is adjacent to, and forms part of the top edge 5 of the board 1. Another horizontal rib 23E is spaced inwardly of the bottom edge 7 of the board 1. The remaining vertical ribs 21B, 21C and 21D are equally spaced apart between the outer vertical ribs 21A and 21E. Similarly, the remaining horizontal ribs 23B, 23C and 23D are equally spaced apart between the outer horizontal ribs 23A and 23E. The recesses 19 formed in the board 1 provide a solid outer panel 25 on the board 1 between the outer surface 15 and the bottom 27 of recesses 19 as shown in Figs. 5 and 6. This outer panel 25 is preferably of uniform thickness.

First cooperating interlocking means are provided on the board 1 at the top and bottom edges 5 and 7, to allow one board 1B to overlap and interlock with an adjacent board 1A just beneath it.

The first interlocking means at the top edge 5, as shown in Figs. 7 to 9, comprise a first flange or rib 33 extending upwardly from the board 1 past the top edge 5. The outer surface 35 of the first rib 33 is in the same plane as the outer surface 15 of the board 1. The inner surface 37 of the rib 33 is spaced outwardly of the inner surface 13 of the board 1 at the top edge 5. The first interlocking

means at the top edge 35 also comprises a second rib 39 spaced downwardly a short distance from the top edge 5, but parallel to it, and extending outwardly of the outer surface 15.

The first interlocking means at the bottom edge 7 on each board 1 comprises a recess 43 formed across the inner bottom edge of the board 1. The recess 43 is defined by a generally horizontal bottom wall 45, spaced upwardly from the bottom edge 7, and by a generally vertical side wall 47, spaced outwardly from the inner surface 13. A first slot 49 is formed in the recess 43, extending upwardly into the board 1 from the bottom wall 45. The first slot 49 extends across the board 1 and has one side that forms a continuation of the side wall 47 of the recess 43. The first slot 49 is sized to receive the first rib 33 from an adjacent board in a close fit. A shallow second slot 51 is formed in the board 1, extending outwardly from the side wall 47 of the recess. This second slot 51 is spaced upwardly slightly from the bottom edge 7 of the board thereby forming an inwardly directed lip 53 in the board 1 between the bottom edge 7 of the board and the second slot 51. The second slot 51, and the lip 53, extend across the board 1 and the second slot 51 is sized to receive the second rib 39 of an adjacent board 1. Actually, the second slot 51 is slightly wider than the second rib 39 for reasons that will become apparent hereinafter.

When a second board 1B of a second row is to be mounted onto a first board 1A of a first row, the second board 1B is first placed over the first board 1A, as shown by arrow "A" in Fig. 8, to place the boards in the same general plane and to locate the second rib 39 of the first board 1A in the second slot 51 of the second board 1B. This causes the mouth of the first slot 49 of the second board 1B to be aligned with and located adjacent to the first rib 33 on the first board 1A. The second board 1B is next slid toward the first

board 1A in a direction parallel to the two boards as shown by arrow "B" to cause the first rib 33 of the first board to enter the first slot 49 of the second board. This causes the second rib 39 of the first board 1A to move upwardly within the second slot 51 in the second board 1B. Once the first rib 33 is snugly within the first slot 49, the second board 1B is secured in place.

The two rib and slot connections between the boards provided an extremely weathertight joint. Indeed, any water driven up by a strong wind, over the surface of the first board 1A under the lip 53 of the second board 1B, will be stopped by the second rib 39 and then directed into the side groove 75 where it may flow downwardly, as will be explained in greater details hereinafter. This particular movement of the infiltration water will be helped by the presence of the air gap left in the slot 51 after the first and second board have been slid into each other, due to the fact that the second slot 51 is wider than the second rib 39.

The two rib and slot connections also provide an extremely efficient lock joint, as the first rib 33 of the first board 1A inserted into the first slot 49 of the second board 1B prevents the latter from being blown up from the roof under strong winds.

Second cooperating interlocking means are also provided on each board 1 so that adjacent boards in the same row can securely interlock together.

The second interlocking means on one side of the board 1 comprise a recess 63 (see Fig. 5) formed along the board at the junction of the side edge 9 and outer surface 15. The recess 63 is defined by an outer wall 65, parallel with the outer surface 15 but inwardly of it, and a side wall 67, parallel with the side edge 9 but also inwardly of it. A small corner of the board 1 is removed as shown at 69 in Fig. 2 so that the outer wall 65 defining the recess 63

terminates at an end wall 71 located a short distance upwardly of the bottom edge 7. The size of the recess 63 is advantageously selected so that the end wall 71 of a board of one row extends over or past the second rib 39 of a board of a lower row (as shown in Fig. 3), when the boards are assembled. A first side groove 75 is formed in the board 1, inwardly of the outer wall 65. The first side groove 75 extends upwardly from the end wall 71 to almost, but not quite, the top edge 5, whereby the groove 75 is close at its upper end by a small wall 76 which is positioned at a higher position than the second rib 29. One wall of the first side groove 75 is in the same plane as the side wall 67. The first groove 75 forms a first lip 79, which lip 79 has an outer side formed from the side edge 9. The recess 63 extends past the top edge 5 cutting off a corner of the rib 33 as shown at 81 in Fig. 2.

The second interlocking means on the other side of the board 1 comprise a second recess 83 (see Fig. 5) formed along the junction of the other side edge 11 and the inner surface 13. The second recess 83 is defined by an inner wall 85, parallel to the outer surface 15 but spaced inwardly of it, and a side wall 87, parallel to the other side edge 11 but spaced inwardly of it. A second side groove 89 is formed in the board 1, extending outwardly of the inner wall 85. The second side groove 89 extends from the top edge 5 down to the bottom edge 7 which extends transversally across 7, as clearly shown in Fig. 1. One wall of the second side groove 89 is aligned with the side wall 87. The second side groove 89 forms a second lip 91 that has one side formed from the side edge 11 of the board 1. The upper corner of the second lip 91 is cut away as shown at 93 in Fig. 1.

Two adjacent boards in the same row interlock together as shown in Figs. 5 and 6 by having the first lip 79 on one board 1 fit into the second side groove 89 on the second adjacent board 1 while the second lip 91 on the second board

fits into the first side groove 75 on the first board. The corner 69 on the one board accomodates the rib 53 on the other board. This second interlocking means again insures an excellent weathertight joint between adjacent boards. In addition, the very particular position of the small wall 76 closing the first side groove 75 prevents any infiltration water stopped by the second rib 39 and falling into the groove 75, from moving up and infiltrating the roof. In addition, as the end wall 71 extends over or past the second rib 39 of the lower board, any infiltration water flowing down the first side groove 75 will be discharged under the rib 39 of the lower board.

Preferably, means are provided on each board 1 for allowing for a slight circulation of air from each recess 19 to the exterior when the board is in place. A shallow groove 101 is provided in each vertical rib 21 in its outer face 13 at each adjacent recess 19 as shown in Fig. 1. Similarly, a shallow groove 103 is provided in each horizontal rib 23 in its outer face 13 at each adjacent recess 19. At least one of the grooves 103 in the bottom horizontal rib 23E continues in the walls defining the recess 43 to the shallow slot 53 as shown by groove 105 in Fig. 10. This shallow groove 105 allows air to flow to slot 53. This slot 53 is wider than the rib 39 it interlocks with. Thus, air can flow from groove 105 into slot 53 and out toward the side edges 9, 11 of the board from where it can pass to the atmosphere. If desired, the groove 105 can continue from the slot 51 into the rib 53 as shown in Fig. 10 to provide direct access to the atmosphere. The grooves 101, 103, and 105 allow for any moisture to be dissapated from within the recesses 19 before it can build up inside the board and create condensation problems.

The board 1 is preferably molded from a suitable insulating material such as high density polystyrene (5pds). The board 1 can be formed with an integral, tough

protective skin to form a ready-to-use shingle. By way of example, the outer surface of the board can be covered with a suitable protective coating such as tar. The layer of tar can be applied to each board before installation. Alternatively, the tar coating can be applied to the boards after they have been installed on a roof or a wall in overlapped and interlocking relationship. The boards are installed in overlapped rows by nailing them to the roof sheating 17 with suitable nails 111 as shown in Fig. 4. Each board in one row, is offset laterally with respect to adjacent boards in adjacent rows as shown in Fig. 3.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A shingle board molded from an insulating material, wherein:

- said board has a generally quadrangular shape defined by a top edge, a parallel bottom edge, and side edges joining the top and bottom edges and extending transversely to the top and bottom edges;

- said board tapers in thickness from the bottom edge to the top edge to have the top edge thinner than the bottom edge;

- said board has an outer, planar, protective surface and an inner, support surface;

- said board comprises first interlocking means at the top and bottom of the board to interlock the top of one board to the bottom of another board, said first interlocking means comprising first and second ribs at the top of the board, and first and second slots at the bottom of the board, the first rib projecting from the top of the board in a direction parallel to the outer surface of the board, the second rib projecting from the outer surface of the board in a direction transverse to said outer surface, the first slot extending upwardly into the board, and the second slot extending outwardly into the board, said second slot being wide enough to allow a second rib on another board to move laterally therein while the first rib on the other board is slid into the first slot;

- said board comprises second interlocking means on each side of the board, said second interlocking means comprising a first side groove and a first lip formed on one side of the board, the first side groove opening toward the outer surface of the board, and the first lip extending

toward the outer surface, and a second side groove and a second lip formed on the other side of the board, the second side groove opening toward the inner surface of the board, and the second lip extending toward the inner surface; said second side groove being located and sized to snugly receive the first lip from an adjacent board while the second lip snugly fits in the first side groove of said adjacent board, to lock the two boards tightly together side by side; and

- said board further comprises an array of recesses formed in the board and extending inwardly into the board from its inner support surface and means for permitting the circulation of air from the recesses, when the board is mounted in place, to the exterior of the board, said air circulation means comprising a network of circulation grooves in the inner surface of the board interconnecting the recesses, a slot in the bottom of the board extending across the board between its two side edges, and at least one outlet groove connecting one of the circulation grooves to the bottom slot.

2. A shingle board as claimed in claim 1, wherein the first side groove is closed by a small wall near the top of the board, said small wall being positioned at a higher position than the second rib of the first interlocking means, and wherein said first side groove extends over the second rib of another lower board that may connected to the said board.

3. An insulated shingle comprising a shingle board as claimed in claim 1 or 2 in combination with a suitable protective coating applied onto the outer surface of the board to cover the same.

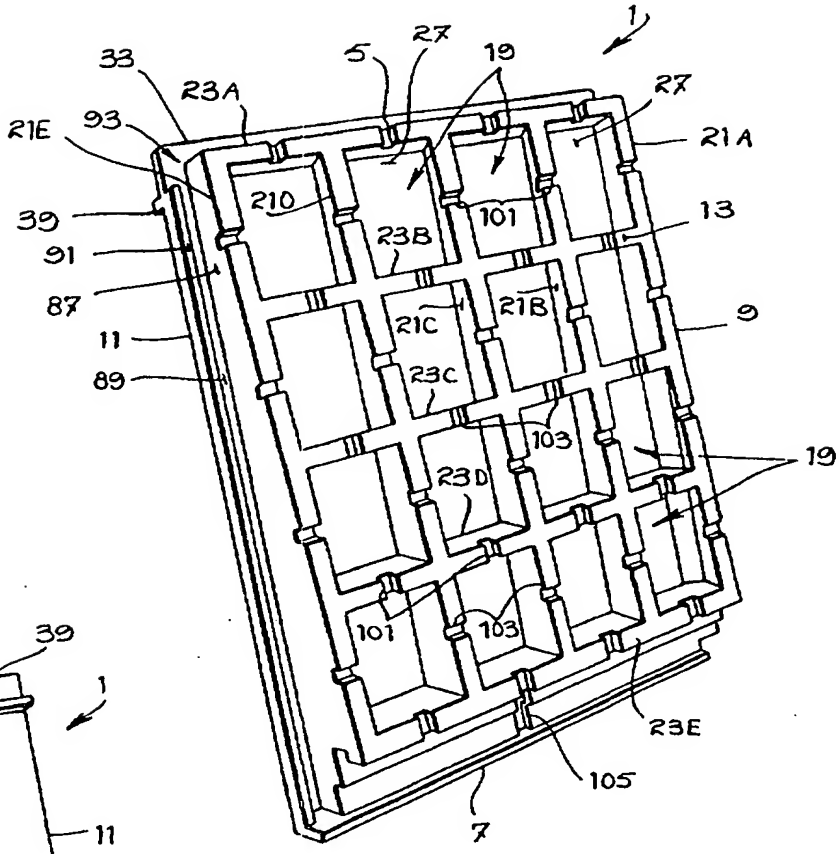


FIG. 1

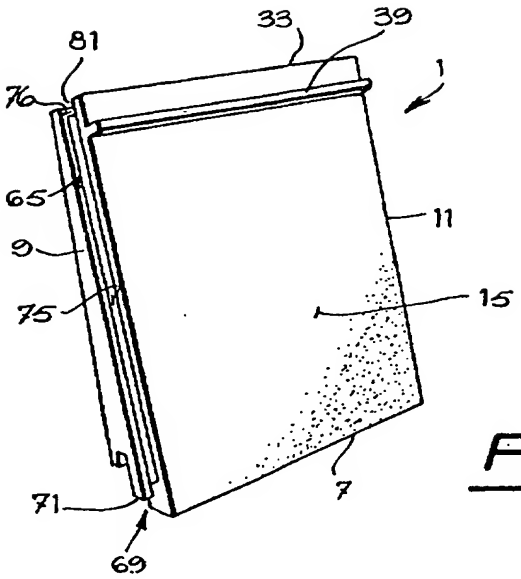


FIG. 2

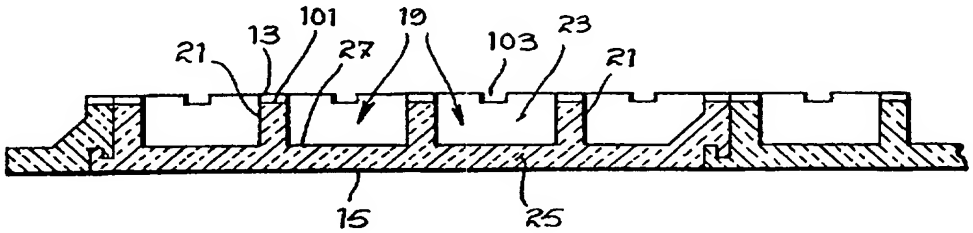


FIG. 6

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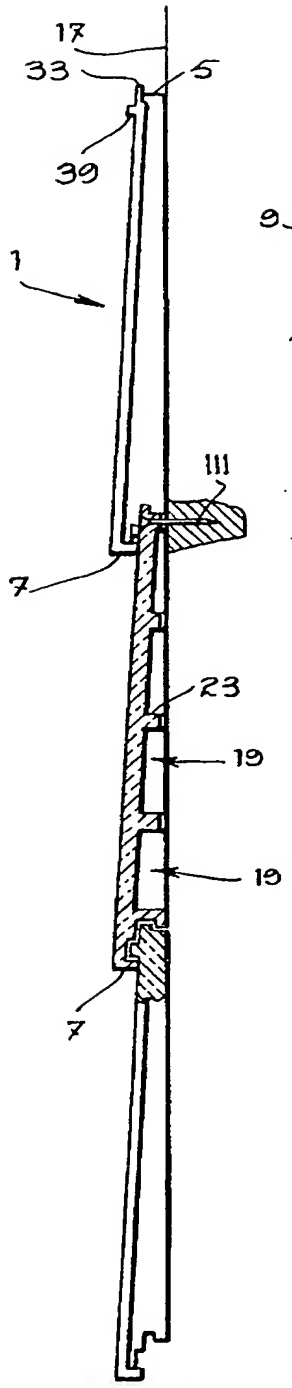

FIG. 4

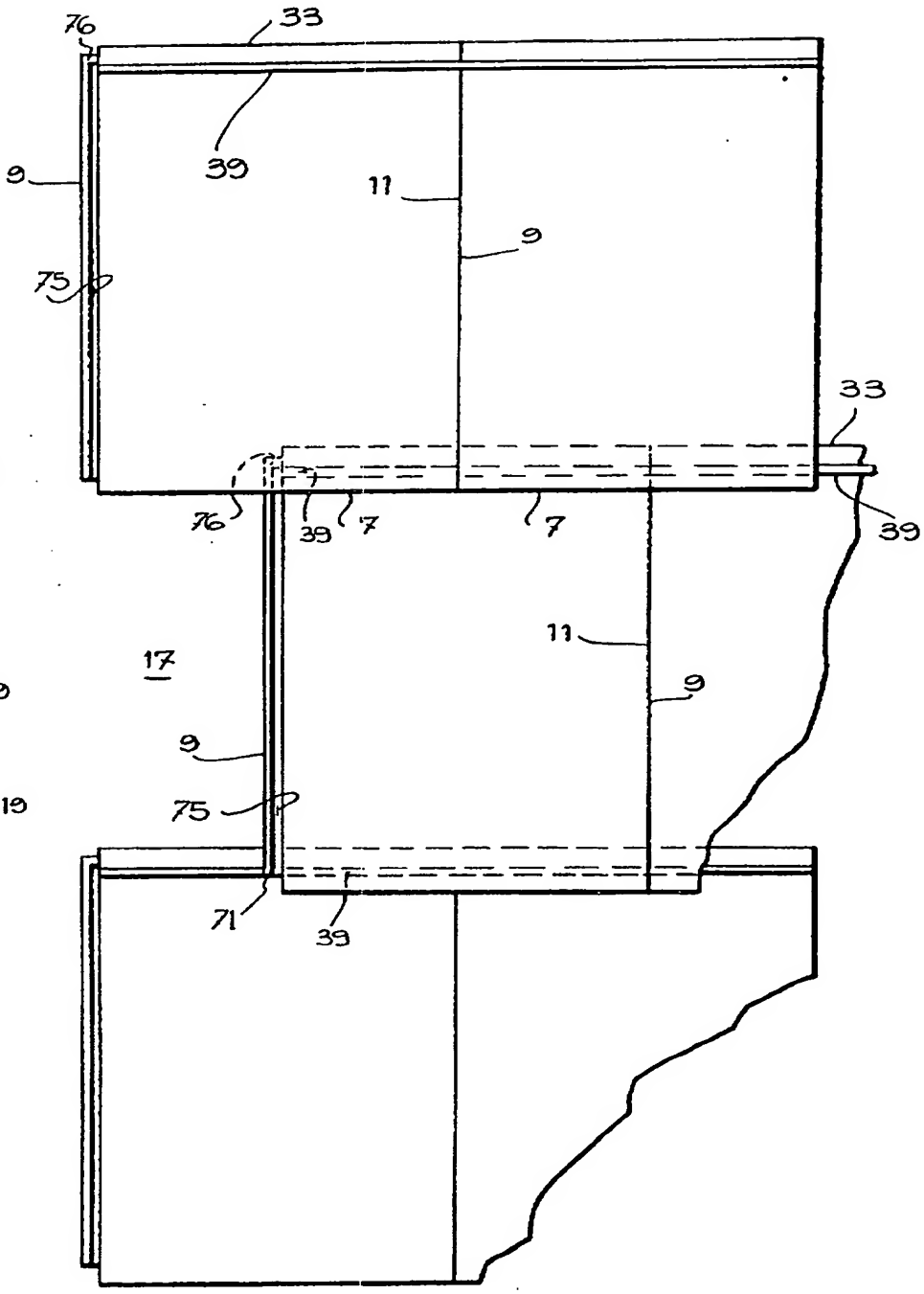

FIG. 3

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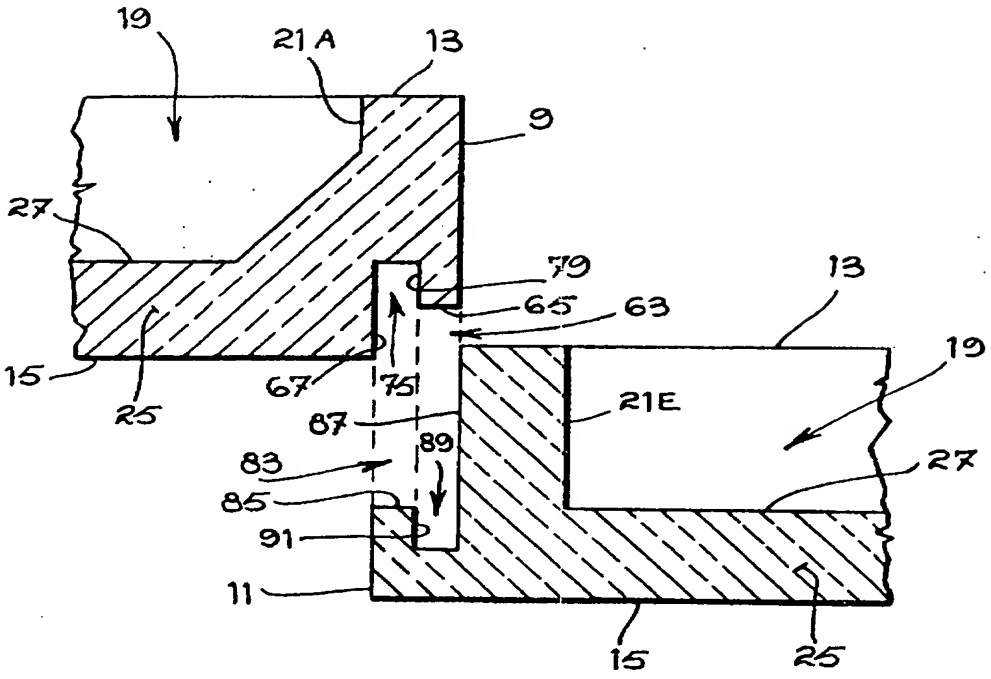

FIG. 5

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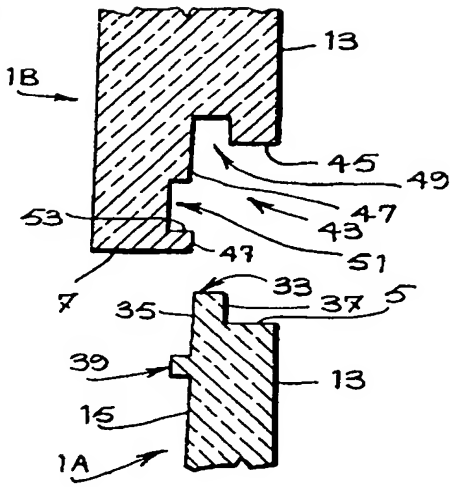
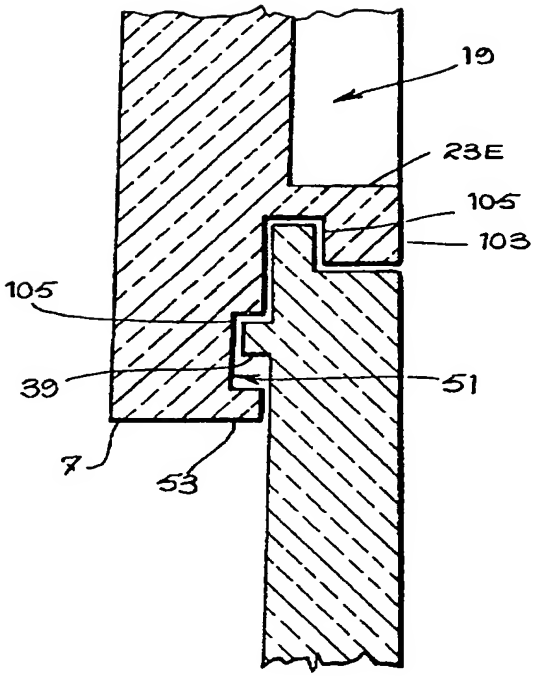
FIG. 7





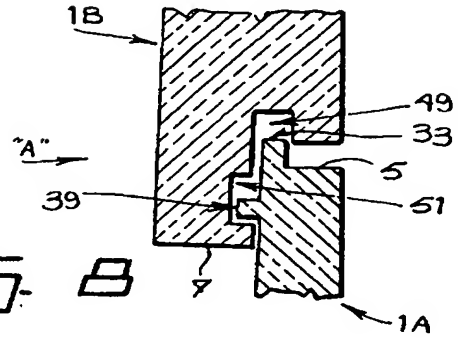


FIG. 8

FIG. 10

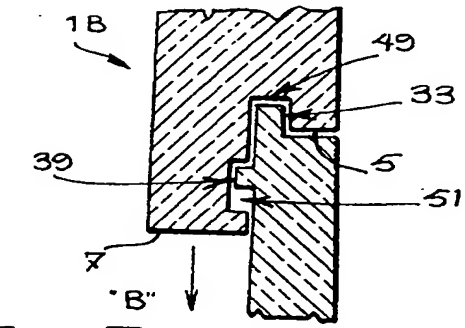


FIG. 9

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